

Sir Charles Bell and the Bridgewater
Treatises

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SIR CHARLES BELL AND THE BRIDGEWATER TREATISES

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It seems to me that there are three reasons why the subject of this paper merits consideration. First, we properly take note of the death of Sir Charles Bell, an eminent anatomist, who died in Worcester, England on April 27th, 1842. He was a scientist who forged an enduring link in the chain of knowledge comparable, as has been frequently pointed out, to the work of William Harvey. Second, the Bridgewater Treatises, with which the name of Sir Charles Bell is indelibly associated, occupies an important place in the cumulative argument of design. Inasmuch as the causes of adaptations with which the Treatises concerned themselves are even now not adequately explained, it appears inevitable that the philosophical implications of the argument of design will come up from time to time as a vital issue, as indeed it has arisen in recent years. Third, our present political, social and economic plight shows us that the world is not quite sure whether Plato or Aristotle was right—whether man is Spirit or Machine. This controversy also occupied the mind of Sir Charles Bell. Philosophers, Historians, Theologians and Scientists continually return to a consideration of the argument of design albeit in the more inclusive and expansive sense of an Immanent controlling principle, as witness the writings of Tennant,¹ Haldane,² Whitehead,³ Osborn,⁴ Eddington,⁵ Pupin,⁶ Becker,⁷ and Einstein.⁸

To come back to Charles Bell himself, the first consideration that I would bring to your notice is that if we would grasp the full significance of the man, we must regard him as the meeting point of two

¹ Tennant, F. R., *Philosophical Theology*, Vol. 2, p. 84, 1930.

² Haldane, J. S., *Mechanism, Life and Personality*, pp. 67, 125, 133, 1923.

³ Whitehead, A. N., *Adventure of Ideas*, 1933, p. 251.

⁴ Osborn, H. F., *Evolution and Religion in Education*, 1926, p. 62.

⁵ Eddington, A. S., *The Nature of the Physical World*, p. 328, 330, 1928.

⁶ Pupin, M., *Has Science Discovered God? A symposium of Modern Scientific Opinion*—Edward H. Cotton, Ed., 1931, p. 183.

⁷ Becker, C. L., *Progress and Power*, pp. 78, 80, 101, 1935.

⁸ Einstein, A., See reference under 6, p. 97, 101.

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lines of intellectual endeavors; namely, his power in rendering intelligible the workings of the human body and his equally strong interest in the religious aspect of natural philosophy. Sir Charles Bell was born in 1774. He was the son of a clergyman. After informal preliminary studies he attended the University of Edinburgh for two years, and then began the study of anatomy as an apprentice to his brother, John Bell, a distinguished anatomist and surgeon. Already in these early days he exhibited strong mechanical and artistic abilities in the dissecting room and at the operating table, and at the age of 25 he became a fellow of the Royal Society in Edinburgh. Beginning with the year 1798 he published from time to time the results of his physiological and clinical studies. In the course of time he took over the direction of the Hunterian School of Medicine in Windmill Street, then a world center for medical education. Today, all medical students know of Sir Charles Bell under the Eponyms of Bell's Law of the Structural and Functional Discreteness of the Motor and Sensory nerves; the External Respiratory nerve of Bell; and the familiar lesion of the facial nerve known as Bell's Palsy.⁹

Let us recall that Charles Bell was born in the latter part of the Eighteenth century when things were relatively stable and tranquil. The mental outlook of this century may perhaps be best described by the word "Unhistorical." The times had a deistic flavor and the philosophy of hedonism prevailed.¹⁰ It was the pre-Darwinian period emphasized so well by Bell himself in a passage in "The Hand" in which he says that "everything declares the Diversity of Species to have its origin in distinct creations . . ." "In fact, whatever science there was played a significant part in having Nature Divinized, for was it not science itself which everywhere revealed Order, Law and Design!" Then, too, the intellectual atmosphere was colored by the theological point of view of such natural philosophers as Locke, Grew, Ray and Linnaeus. That Bell came under the influence of some of these factors is evidenced in the following two letters. For instance, his natural piety is indicated under date of November

⁹ *Medical Classics*, Vol. 1, 1936-37, p. 81, Ed. E. C. Kelly.

¹⁰ *Encyclopedia of Religion and Ethics*. Ed. J. Hastings, Vol. XII, pp. 315-232, 1922.

¹¹ Charles Bell, *The Hand, Its Mechanism and Vital Endowments, Envincing Design*, Seventh Edition. Revised by Alexander Shaw, Lond., 1865, p. 113.

2, 1810,¹² in a letter he wrote to his future wife, Marion Shaw: "I see a God in everything, it is the *habit* of my mind. Do you think I could have been employed as I have been without contemplating the architect?" Again, he writes to his brother on December 5, 1818: "I love Nature and Nature's God with a sense of devotion—and I have never for a day let myself be lost in mere worldliness."¹³ This reverential attitude is seen in many of his writings. There was as yet nothing in the latter part of the Eighteenth century to replace the prevailing Mechanical view of the Universe similar for example to the protest which the Baconian and Cartesian physics made against scholastic Aristotelianism. The advent of the theory of Evolution by Darwin was yet to come to the front.

A brief backward glance of the history of Natural Theology, to which Bell made his contribution in the book on "The Hand" will set the stage for our interpretation of that book. Natural Theology, in the time of Bell, was a conception which emphasized evidences of contrivances and design in nature ordered by an Intelligent Being for a Purpose. Our first effort, then, must be to remove ourselves from this conception of Natural Theology made so familiar to us by William Paley and the Bridgewater Treatises. We recall, for example, that Aristotle¹⁴ in his *De Caelo* writes that God and Nature create nothing that has not its use and further that in his *De Anima*¹⁵ declares that Nature does nothing in vain and omits nothing that is indispensable. The teleology of Galen's *De Usu Partium* has its roots in the books of Aristotle, just quoted. We also remember that Cicero in the *De Natura Deorum*¹⁶ remarks "that man has been cared for by divine providence will be more readily understood if we survey the whole structure of man and all the conformation and perfection of human nature." Maimonides,¹⁷ whose medical practice is based upon Galenic philosophy uses the same evidence. Francis

¹² Letters of Sir Charles Bell, Selected from His Correspondence with his Brother, George Joseph Bell, 1870, p. 180.

¹³ *Ibid.*, p. 264.

¹⁴ The Works of Aristotle—W. D. Ross, 1936, Vol. II. *De Caelo*, I, 4, 271a, 34-35.

¹⁵ Aristotle, *De Anima*, R. D. Hicks, III, 9, 432b, 21. 1907.

¹⁶ Cicero *De Natura Deorum Academica*, II, 54, sect. 133, Tr. H. Rackham, 1933.

¹⁷ Sarton, G. *Introduction to the History of Science*, Vol. II, Part I, p. 74, 1931.

Bacon¹⁸ in his book "On the Advancement of Learning" defines Natural Theology to be a knowledge, or rather a spark and rudiment of that knowledge, concerning God such as may be had by the light of Nature and the Contemplation of the Creature. We should also make note of one or two other authors who expounded Natural Theology. There is, for example, Sir Thomas Browne¹⁹ who writes in vigorous language that "There are two books from whence I collect my Divinity besides that written one of God, another of his servant Nature, that universal and publick *Manuscript* that lies expans'd unto the eyes of all, those that never saw him in the one have discovered him in the other." In the 17th century John Ray and William Derham popularized the idea of making the book of nature a commentary on the book of revelation and in the 18th century and the early part of the 19th Natural Theology was cultivated with unparalleled zeal, coming to an end point in the Bridgewater Treatises. Before leaving this brief historical review, I wish to quote a passage from Spinoza since he is a striking example of one who did not share the opinions just outlined. Spinoza's answer to those who allege design is that their amazement at the structure of the human body is all due to their ignorance of the causes and because of this very ignorance conclude that the body was made not by mechanical but by divine or supernatural art.²⁰ We see then that the sort of thing which Bell does in the book on "The Hand" stretches back through the centuries and that the word "Design" is really not a blank cartridge as William James²¹ would have it in his philosophy of Pragmatism.

We come now directly to a consideration of "The Hand, Its Mechanism and Vital Endowments, as Evincing Design." What sort of a book is it? Does it, as one author²² has it, attempt to ransack the animal world to find arguments in comport with the desires of the reverend committee entrusted to carry out the aim of

¹⁸ Francis Bacon, *On the Advancement of Learning*. Interpreted by Gilbert Wats, Lond., 1674, Lib. III, Chap. II.

¹⁹ Sir Thomas Brown, *Religio Medici*, Boston, 1862, XVI, p. 32.

²⁰ H. A. Wolfson, *The Philosophy of Spinoza*, Vol. I, p. 435. 1934.

²¹ William James, *Pragmatism*, 1907, p. 115.

²² *Miscellaneous Papers of Andrew Jackson Dowe*, M. D. 1894, p. 262.

the Rev. Francis Henry Egerton, Eighth Earl of Bridgewater? That this point of view is incorrect and in fact, an injustice to Bell, I shall support by citing passages from the book itself. The earl died in the year 1829 and directed in his will that the sum of £ 8000 and accruing dividends be paid to those selected to write, print and publish one thousand copies of a work: "On the Power, Wisdom and Goodness of God as manifested in the Creation, illustrating such work by all reasonable arguments, as for instance the variety and formation of God's creatures in the animal, vegetable and mineral kingdoms, the effect of digestion and thereby of conversion, the construction of the hand of man and an infinite variety of other arguments, as also by discoveries ancient and modern in arts, sciences, and the whole extent of modern literature."²³ I repeat that it is necessary to keep in mind the fact that Bell was eminently pious and indeed had already five years before embodied in his treatise on Animal Mechanics (1827) a discussion of the concept of natural theology. Even more to the point is Bell's comment in his Preface to the book entitled "The Hand." These are his words: "The reflections contained in these pages have *not* been suggested by the occasion of the Bridgewater Treatises but arose long ago. An anatomical teacher, himself aware of the higher bearings of his science can hardly neglect the opportunity which the demonstrations before him afford of making an impression upon the minds of those young men who for the most part receive the elements of their professional education from him; and he is naturally led to indulge in such trains of reflection as will be found in this essay."²⁴ It appears from this passage that Bell looked upon the matter as a Duty to be performed. One may, indeed, go back twenty years before the publication of "The Hand" and find Bell in the year 1813 exposing the futility of the French philosophers and physiologists, for example St. Hilaire, who represent life as a mere physical result of certain combinations and actions of "elements."²⁵

Another aspect to bear in mind is that Charles Bell took a larger view of design than is ordinarily understood by the Bridgewater

²³ Catholic Encyclopedia, 1907, vol. 2.

²⁴ "The Hand"—Preface.

²⁵ *Ibid.*,—Preface.

Treatises. A reference to the *ipsissima verba* of some of his letters will make clear his attitude. On December 15, 1815, he writes to his brother: "I, for my part, have no pleasure but in anatomy. You will say that it is that I may become the captain of anatomists; but why then have I such inexhaustible delight in the *whole face of nature*? No, it is in the pleasure I have in investigating *structure*. Everything there so *perfect*, so curiously *fitted* and leading you, little by little, to the comprehension of a Wisdom."²⁶ Again on March 2, 1818, he writes: "If I am to be anything, it is from connection with Natural Philosophy by Anatomy. I have resolved to address men of science (a group of engineers) on the uses of anatomy by which I shall show them how God Almighty makes arches and ropes."²⁷ It is not far afield to say that such thoughts impelled Bell to discover God by the laboratory method, and to say this is not to imply irreverence.

We may rightly ask the question as to why Bell found the human hand a favorable field for his intellectual powers. The answer again is to be gotten in his own words—"the hand represents the last and best proof in the order of creation of that principle of Adaptation which evinces Design."²⁸ Further, "there is extreme grandeur in the thought of anticipating or prospective Intelligence, nor are these conclusions too vast to be drawn from the examination of a part so small as the Human Hand."²⁹

Bell's method of developing his thoughts is interesting. He has, for example, no fear of considering the body as a Machine only; on the other hand, he does not see the necessity for doing so. The important thing, in his opinion, is to handle the matter with a mind free from vicious bias. This attitude, we should agree, conforms to the high standards of good scientific thought and work. To support his thesis in "The Hand," Bell, the scientist, goes to the field of Comparative Anatomy to bring forth evidence of perfection of structure, and he uses this tool because of his respect for the genius and good sense of the distinguished naturalist, Cuvier. Bell devotes considerable space to discussions of the anatomy of the quadrumana—the sloth, bear, eagle, lizard, horse, elephant, deer, frog, snail, bat and even antediluvian fossils.

²⁶ "Letters"—p. 251.

²⁷ "Letters"—pp. 259, 260.

²⁸ "The Hand" p. 28.

²⁹ *Ibid.*, p. 270.

It seems surprising that an investigator, so meticulous in observation, so exact in experiment as Bell has shown himself, would allow his mind to become involved in speculative doctrines of the Aristotelian school. However, the surprise is measurably lessened when we observe that in the Introduction to "The Hand," Bell takes the position that in the mechanical construction of animals, as in their endowments of life, they are created *in relation to the whole*, planned together and fashioned by one MIND³⁰ and in addition that nothing is satisfactory until it is declared and believed that it has been the will of an Omnipotent Being to create.³¹ Bell is sufficiently imbued with this idea to be disturbed at what he calls the perverse ingenuity of some distinguished naturalists who seek to obscure the conception of a Divine Author, an intelligent, designing and benevolent Being. And yet, the objectivity of Bell's scientific works indicates that he understood clearly that Science *must* fail if it attempts to grasp a totality.

Up to this point I have brought together evidence to support the opinion that Bell is distinctly a product of a combination of two strong impulses within himself—the scientific and the religious or devotional.

I wish now to direct your attention to one scientific contribution referred to by Bell in "The Hand" to show how he colors it by the underlying concept of Prospective Design,—that is, modifications in structure in preparation for but never consequent upon a new condition.³² In his discussion of Sensibility and Touch, Sir Charles Bell makes the keen observation and develops the thought that in the matter of the sense of touch, we must not only feel the contact of the object but we must be sensible of the *muscular* effort made to reach or grasp it in the fingers. To this consciousness of muscular exertion he gives the name "muscular sense," calling it a sixth sense. His exact words are: "I was finally enabled to show, first by anatomy, and then by experiment, that the muscles are provided with two classes of nerves; that on exciting one of these, the muscle contracts; on exciting the other, no action takes place; and that the nerve which has no direct power over the muscle is for giving sensation."³³

³⁰ *Ibid.*, p. 6.

³¹ *Ibid.*, p. 25.

³² *Ibid.*, p. 11.

³³ *Ibid.*, p. 149.

This eminently valuable discovery does not escape Bell's opinion that here, as elsewhere, we behold Prospective Design in Nature, for he further writes: "I enter upon its examination (i. e., Sensibility and Touch) the more willingly because NOTHING can afford more surprising proofs of design and benevolence in the Author of our being than this property."³⁴

In this connection, Leonard Carmichael,³⁵ quotes the great physiologist, Sherrington, to the effect that Sir Charles Bell was the first definitely to postulate the modern physiological doctrine of the muscle sense and to place this modality on a scientific parity with the five senses of antiquity.

One more example: The name of Johannes Müller is usually associated with the important scientific discovery of The Doctrine of the Specific Energy of Nerves. It must be recorded, however, that Bell at an earlier date considered this problem not only scientifically but also with reference to benevolence and design. In "The Hand," in speaking of the eye, he writes: "If the retina were sensible to the matter of light only from possessing a finer sensibility than the nerve of touch, it would be a source of torment; whereas, it is most *beneficially* provided that it shall not be sensible to pain, nor be capable of conveying any impression to the mind but those which operate according to its proper function producing light and color."³⁶

In conclusion, may I point out that in writing the book on "The Hand," Sir Charles Bell brought to it a mind of exceptional acuteness and strong powers of observation, together with a deep religious sense such as has been true from time immemorial of many others engaged in investigations of nature. We have seen how he protests and rebels against sterile materialism. I suspect that his point of view for the time in which he lived served to satisfy his quest for an explanation of the Universe at large as did the Elan Vital of Bergson, the Emergent Evolution of Lloyd Morgan, or the Principle of Organism of Whitehead of more recent times. Bell could not view the Universe as a "bloodless dance of categories;" the Universe

³⁴ *Ibid.*, p. 120.

³⁵ Leonard Carmichael, Sir Charles Bell—A Contribution to the History of Physiological Psychology, *Psychol. Rev.* 33, 1926, p. 204.

³⁶ *Ibid.*, p. 200.

must be innate with Purpose.³⁷ In this way he is almost one with a contemporary famous neurologist, Foster Kennedy,³⁸ who remarks that to attempt to apprehend the stars in terms of a mathematical formula is probably like mistaking an electroencephalogram or a metabolism for the Personality of a poet. It was Huxley³⁹ in his Essay on the Genealogy of Animals who says that "perhaps the most remarkable service to the philosophy of Biology rendered by Mr. Darwin is the reconciliation of Teleology and Morphology." This means that today before we can *speak* of the teleologist, we must learn to use the *glasses* of the evolutionist.

In closing I draw attention to the Inscription placed on the Tablet in Hallow Churchyard in Worcester which exemplifies the *whole* man.

SACRED TO THE MEMORY
OF
SIR CHARLES BELL
who after unfolding with
unrivalled sagacity, patience and success
the wonderful structure of our mortal
bodies, esteemed lightly of his greatest discoveries
except only as they tended to impress
himself and others with a deeper sense
of
The Infinite Wisdom and Ineffable Goodness
of the
Almighty Creator.

³⁷ V. F. Storr, *Development and Divine Purpose*, p. 126, 1906.

³⁸ Foster Kennedy, *Philosophy*, vol. XV, 1940, pp. 417-428.

³⁹ T. H. Huxley, *Darwiniana*,—1896, p. 110.

